

WE MAKE PILOT TRAINING FUN AND EASY!

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Can you drive a car and/or ride a bicycle?
 If so, you can probably pilot an airplane!
 Why not? It's an exhilarating experience to be up in the air.
What a view!!

LEARNING TO FLY: IT'S EASY!

You probably have a driver's license issued by your state government. The federal government governs pilot privileges and requires specific flight experience, a knowledge (written) test, and a practical (flight) test to earn a pilot's license (called a certificate). The Federal Aviation Administration (FAA) is an agency within the U.S. Department of Transportation.

Flying an airplane is somewhat more complex than driving a car because you are controlling altitude (up and down) in addition to left-right movement. It is also more exhilarating because you have the freedom of three-dimensional movement, greater speed, and spectacular panoramas. Flying provides lifelong satisfaction and pride.

Learning to fly and earning a pilot certificate are fun. Many people might consider "piloting" beyond their capability or budget, but it is not as difficult, time consuming, or expensive as generally believed.

FIVE BASIC STEPS TO YOUR PILOT CERTIFICATE

1. Purchase the Gleim Private Pilot Kit.
2. Prepare for and pass the FAA Pilot Knowledge Test (60 multiple-choice questions).
3. Obtain a student pilot certificate in conjunction with a routine medical exam given by an FAA-approved doctor.
4. Select a flight instructor and/or flight school.
5. Pass an FAA flight test consisting of 50 pre-specified tasks.

TO: **Pilots and Potential Pilots**


FROM: **Irvin N. Gleim, Ph.D., CFII**

We prepare "user-friendly" self-study materials that are inexpensive and very effective. Just as a carefully prepared teacher can present a class that helps you learn, carefully designed books, computer software, audios, and online courses can make it easy for you to learn and understand.

We convert the FAA test process from a memorization marathon into a learning opportunity and experience. You get higher test scores in less study time. Our products are **NOT** additional work; they are designed to save you time, effort, frustration, and money.

WHAT IS A PRIVATE PILOT CERTIFICATE

Obtaining a private pilot certificate allows you to fly an airplane and carry passengers and baggage. Although operating expenses may be equally shared with your passengers, you may not fly for "compensation or hire." The certificate is sent to you by the FAA upon satisfactory completion of your training program, a knowledge test, and a practical test. A sample private pilot certificate is reproduced to the right.

I U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION		XI 	
IV NAME JOHN WILLIAM SMITH			
V ADDRESS 1607 NW 50TH TER GAINESVILLE, FL 32605-4665		VI NATIONALITY USA	D.O.B. 24 DEC 1978
SEX M	HEIGHT 72	WEIGHT 157	HAIR BROWN
EYES BLUE			
IX HAS BEEN FOUND TO BE PROPERLY QUALIFIED TO EXERCISE THE PRIVILEGES OF			
II PRIVATE PILOT			
III CERTIFICATE NUMBER 123456789			
X DATE OF ISSUE 7 JUL 1997			
VII <i>John William Smith</i> SIGNATURE OF HOLDER		XIV <i>FAA Signature</i> VIII ADMINISTRATOR	

STUDENT PILOT CERTIFICATE

UNITED STATES OF AMERICA Department of Transportation Federal Aviation Administration		EE- 5342031	
MEDICAL CERTIFICATE <u>3rd</u> CLASS AND STUDENT PILOT CERTIFICATE			
This certifies that (Full name and address): Richmond, Kane Everett 7771 Coral Way N. Ft. Myers, Fl. 33903			
Date of Birth	Ht.	Wt.	Hair
1/30/67	5'9"	140	Brn.
Eyes	Sex		
Brn.	M		
has met the medical standards prescribed in Part 67, Federal Aviation Regulations, for this class of Medical Certificate.			
Limitations	None		
Date of Examination	Examiner's Serial No.		
1/26/00	11967-1		
Examiner	Signature <i>E.W. Williams, II, D.C.</i>		
	Typed Name E.W. Williams II, D.O.		
AIRMAN'S SIGNATURE <i>Kane Everett Richmond</i>			

FAA Form 8420-2 (7-92) Supersedes Previous Edition

You must be at least 16 years of age to receive a student pilot certificate. You must undergo a routine medical examination that may only be administered by FAA-designated doctors called aviation medical examiners (AMEs).

A third-class medical certificate is valid for 3 years if the date of the examination was before your 40th birthday, or 2 years if the date of the examination was on or after your 40th birthday.

Visit our Internet site at www.gleim.com/Aviation/AME for a listing of AMEs, by state and city. Call (800) 87-GLEIM if you have questions.

Even if you have a physical handicap, medical certificates can be issued in many cases. Operating limitations may be imposed depending upon the nature of the disability.

FAA REQUIREMENTS TO OBTAIN A PRIVATE PILOT CERTIFICATE

1. Be at least 17 years of age when you finish your training and take your FAA practical (flight) test.
2. Be able to read, speak, write, and converse fluently in English.
3. Obtain at least a third-class FAA medical certificate and student pilot certificate.
4. Pass the private pilot knowledge test with a score of 70% or better. All FAA tests are administered at FAA-designated computer testing centers.
 - a. The private pilot knowledge test consists of 60 multiple-choice questions selected from the 700+ airplane-related questions in the FAA's test bank. Each question, answer, and complete explanation is provided in Gleim's **Private Pilot FAA Written Exam** book and **FAA Test Prep** software.
 - b. Use Gleim and pass with confidence. We make it easy and fun.
5. Undertake flight training as described in lessons 1 through 27 in Gleim's **Private Pilot Syllabus and Logbook**. Many of the lessons will require more than one flight to make you comfortable and proficient.
 - a. Under Part 61 of the federal aviation regulations, you must receive a total of 40 hours of flight time, including a minimum of 10 hours of solo (i.e., by yourself) flight time in an airplane.
 - b. As an alternative to Part 61 training, you may enroll in an FAA-certificated pilot school that has an approved private pilot certification course (airplane).
 - 1) These schools are known as Part 141 schools because they are authorized by Part 141 of the federal aviation regulations.
 - 2) The Part 141 course must consist of at least 35 hours of ground training and 35 hours of flight training.
 - 3) There is little difference between Part 61 training and Part 141 training, except that a Part 61 course has more flexibility to adjust to your individual needs.
6. Successfully complete a practical (flight) test which will be given as a final exam by an FAA-designated pilot examiner. Each of the 50 required tasks/maneuvers is both explained and illustrated in Gleim's **Private Pilot Flight Maneuvers and Practical Test Prep** book.
 - a. FAA-designated pilot examiners are proficient, experienced flight instructors/pilots who are authorized by the FAA to conduct practical tests. They typically charge a fee for their services.
 - b. If you use Gleim's **Private Pilot Flight Maneuvers and Practical Test Prep** book, you will pass your FAA practical test with CONFIDENCE!
7. If you have any questions now or throughout your flight training, call (800) 87-GLEIM or e-mail Aviation@gleim.com. We're here to help.
 - a. Order your Gleim **Private Pilot Kit** today.

FLIGHT TRAINING

1. Obtain Gleim's **Private Pilot Kit** (see back cover and page 32). Additionally, once you begin your pilot training, purchase a local sectional chart, an *Airport/Facility Directory*, and a copy of your airplane's *Pilot Operating Handbook (POH)*.
2. Visit several flight schools, if more than one is available, to talk to flight instructors about flight lessons. Visit <http://www.gleim.com/Aviation/cfidirectory.html> (Gleim's CFI Directory) to locate a CFI near you. Alternatively, look under aircraft schools, airplane instruction, aircraft sales, airports, etc., in the Yellow Pages. Indicate that you are interested in taking flying lessons and want to choose a flight instructor you will feel comfortable with.

Make sure that the CFI is familiar with the Gleim private pilot training materials (the books with the red covers) and is enthusiastic about using them. If you encounter hesitation, call (800) 87-GLEIM.

Plan to speak to several instructors. While there are no perfect answers, the following questions should be asked. The objective of these questions is to gain insight into the flight instructor's personality.

- a. Do you instruct full- or part-time? This information concerns availability only. Part-time does **not** imply less proficiency or less availability.
 - b. Ask to see their syllabus. Compare it to your Gleim **Private Pilot Syllabus and Logbook**.
 - c. How long does your average student take to solo? Note that the flight instructor who solos his/her students in the least amount of time may not necessarily be the best instructor.
 - d. How many total hours of solo and dual flight do your typical students require?
 - e. What percent of your students require more than 40 total hours? (Probably 100%.) How much more? A national average of 55+ flight hours is often quoted.
 - f. What is the rental cost for your training aircraft, solo and dual?
 - g. Where do you recommend that I take my pilot knowledge and practical tests, and what are the estimated costs?
 - h. Where do you recommend that I take my medical examination? (See www.gleim.com/aviation/AMESearchp.html)
 - i. What are the flight instructors' schedules and the schedule of available aircraft?
 - j. Do you have an introductory flight for a nominal fee, e.g., \$49? May I take it with no further obligation?
3. Once you have made a preliminary choice of flight instructor, you need to sit down with your flight instructor and map out a plan.
 - a. When and how often you will fly
 - b. When you will take the FAA private pilot knowledge test
 - c. When you should plan to take your FAA practical test
 - d. When and how payments will be made for your instruction
 4. Consider purchasing an airplane (by yourself or through joint ownership) or joining a flying club. Frequently, sharing expenses through joint ownership can reduce the cost of flying. Note, however, that insurance for student pilots and flight instruction is very expensive. Thus, unless there are other student pilots already using the airplane, the incremental insurance costs will probably be prohibitive.

HELPFUL ORGANIZATIONS

Gleim cooperates with and supports all aspects of the flight training industry. Organizations that help recruit people to aviation in general and flight training in particular receive emphasis. These include: BE-A-PILOT, EAA, AOPA, and the CAP.

PROBLEM AND SOLUTION

The success of the airline industry since the advent of large jet transport airplanes in the 1960s has been overwhelming. Most people believe airplanes are to be ridden in as a passenger, rather than flown as a pilot. In contrast, when you see a nice automobile, you usually project yourself into the driver's seat and imagine yourself driving the automobile.

We want YOU and everyone else to do the same with airplanes. Imagine yourself in the left seat as the pilot. Try it, it's fun: imagine yourself flying the airplane as the pilot when you see airplanes. Next, stop dreaming and start flying!

NONPILOT PILOT TRAINING

Make use of Gleim to learn more about pilot training. This "Learn to Fly - Become a Pilot" booklet provides IDEAL advance preparation for introductory flights offered by BE-A-PILOT, EAA Young Eagles, EAA Flying Start, AOPA's Project Pilot, and the Civil Air Patrol.

Pages 2-10 are introductory
Pages 11-16 explain about airplanes and how they fly
Pages 17-22 explain basic flight maneuvers

Thus, you should read and understand pages 11 through 22 before your introductory flight so you enjoy the most benefit and learn exactly what's involved in flying an airplane. In fact, you will be flying the airplane with competence and confidence during your new first flight if you study pages 11 through 22 in this booklet.

BE-A-PILOT: INTRODUCTORY FLIGHT

BE-A-PILOT is an industry-sponsored marketing program designed to inspire people to "Stop dreaming, start flying." BE-A-PILOT has recruited flight schools to participate in the program and offers a \$49 introductory flight certificate that can be redeemed at a participating flight school.

The goal of this program is to encourage people to experience their dreams of flying through an introductory flight and to begin taking flying lessons.

For more information or to receive a flight certificate, you can visit the BE-A-PILOT home page at <http://www.beapilot.com> (for a flight certificate, go to www.beapilot.com/register.html) or call 1-888-BE-A-PILOT.

EXPERIMENTAL AIRCRAFT ASSOCIATION: YOUNG EAGLES PROGRAM

The Experimental Aircraft Association's (EAA) Young Eagles Program has set a goal of providing a free introductory flight to 1 million young people ages 8 through 17 years old.

The Young Eagles Program is intended to help young people understand the important role aviation plays in our daily lives and, at the same time, provide insight into how an airplane flies, what it takes to become a pilot, and the high standards flying demands in terms of safety and quality. Most importantly, a Young Eagles experience offers a new perspective on the world in which these young people live, providing a unique, "Eagle's eye" view of their home, their school, and their community. For more information about the Young Eagles Program, visit the EAA home page at <http://www.eaa.org> or call 1-800-564-6322.

EAA FLYING START PROGRAM

The Flying Start Program, sponsored by EAA and its affiliate, the National Association of Flight Instructors (NAFI), could be your first step in learning to fly. Offered by local EAA members at sites across the United States, Flying Start is a 60-minute program that walks interested individuals through the process of learning to fly: what it costs, how long it might take, safety, instruction, and subsequent flying and social activities associated with flight. Flying Start, working closely with BE-A-PILOT, is one of the main distribution points for the \$49 flight certificates previously mentioned.

AOPA's PROJECT PILOT

AOPA Project Pilot asks AOPA members to take an active role in finding potential new pilots and offering them advice, help, and encouragement as training progresses. Student pilots who have an active, concerned mentor are much more likely to complete their training than those who do not. This mentor program is AOPA's primary means of distributing BE-A-PILOT literature. Call 1-800-872-2672 or see www.aopa.org.

CIVIL AIR PATROL: CADET ORIENTATION FLIGHT PROGRAM

The Civil Air Patrol (CAP) Cadet Orientation Flight Program is designed to introduce CAP cadets to flying. The program is voluntary and primarily motivational. It is designed to stimulate the cadet's interest in, and knowledge of, aviation.

Each orientation flight is approximately 1 hour, follows a prescribed syllabus, and is usually in the local area of the airport. Except for takeoff, landing, and a few other portions of the flight, cadets are encouraged to handle the controls. The Cadet Orientation Flight Program is designed to allow five airplane flights, but you may be able to fly more.

For more information about the CAP cadet program nearest you, visit the CAP home page at <http://www.capnhq.gov> or call 1-800-FLY-2338.

INTRODUCTORY FLIGHT

An introductory flight is an amazing opportunity for you to experience flying. Most flight schools and instructors charge only \$49 for an introductory flight. Just call a local flight school and give it a shot. You will find that flying is not as difficult as you previously thought. But, it is a lot more fun!

We suggest that you request an early morning or late afternoon flight with the objective of flying in smooth air, which will be more enjoyable to you. Windy conditions will make your flight bumpy. Reschedule if appropriate to ensure a very positive experience and maximum enjoyment.

Congratulations! You have taken the first big step toward learning to fly by scheduling —

1. Your introductory flight through BE-A-PILOT,
2. Your Young Eagle airplane ride with the Experimental Aircraft Association,
3. Your first Cadet Orientation Flight with the Civil Air Patrol, or
4. Your first lesson or other flight.

Now that your flight is scheduled, what should you expect? Fun, excitement, and the thrill of flying, of course!

You will meet your instructor (or pilot), and if this is an introductory flight, your instructor will probably take you directly to the airplane you will be flying, after a short briefing of what to expect. When you arrive at your airplane on an introductory flight, your instructor will perform the preflight inspection and answer any of your questions. On your first flight lesson, you will do the preflight inspection along with your instructor. During your first few flight lessons, your instructor will go into great detail about what to inspect -- with the goal of forming the same habit in you.

When the airplane passes the preflight check, you will get into the airplane with your instructor, who will help you adjust your seat properly and explain the flight controls and the instruments. Fasten your safety belt and shoulder harness before beginning the procedure to start the engine and taxi out to the runway. Notice your instructor is using a checklist to ensure that all of the steps are done in a logical order and that the airplane is safe to fly.

Your instructor may let you taxi the airplane, which you steer with your feet by pressing the rudder pedals.

As all of this is happening, you may say to yourself, "This is great, but how will I ever learn to do all of this?" Remember that, at one time, your flight instructor, airline pilots, and even astronauts were sitting where you are now. This is a new experience and it is natural to feel overwhelmed. You will not be expected to know everything at the beginning.

After all of the checks have been done, your instructor will assure you that the airplane is ready for takeoff. This is why you are here! Your instructor will taxi the airplane out onto the runway, line it up with the centerline, and move the throttle to full power. Most instructors will have you keep a hand on the control yoke and both feet on the pedals. Follow your instructor's movements on the controls, but the instructor is flying the airplane.

LIFTOFF! Now you are flying! That seemed pretty easy, and as the airplane climbs higher, the view is breathtaking. Your instructor will inform you that you have the controls. Yes, you are now flying the airplane. Your instructor will demonstrate how to fly straight-and-level, make turns, and climb and descend. These maneuvers are briefly described here and explained in more detail on pages 17 through 22.

- A. **Level flight** means flying at a constant altitude by keeping a reference point, like the airplane's nose, in a fixed position relative to the horizon.
 - 1. The altimeter is an instrument that measures altitude and is used to determine whether level flight is being maintained.
 - a. If altitude is being lost or gained, the nose of the airplane should be moved up or down in relation to the horizon, and then the altimeter should be checked to determine if altitude is being maintained.
 - 2. Pulling back or pushing forward on the control yoke moves the nose up or down.
 - a. The control yoke is also called a control wheel or control stick. In some airplanes, it is a stick that can be moved right or left and forward or back.
- B. **Straight flight** means flying on a constant heading, or direction. You should form an imaginary line by selecting two or more reference points, like roads, towns, or lakes, that are directly ahead of the airplane. Then keep the airplane headed along that line.
 - 1. The wings should be kept level by using the ailerons. The ailerons are controlled by turning the control yoke left or right.
- C. To **turn** the airplane, you must turn the control yoke, or wheel, while pressing the appropriate rudder pedal with your foot. In other words, to turn left, you must turn the control wheel to the left and press the left rudder.
 - 1. To come out of a turn, you must turn the control wheel in the opposite direction and press the opposite rudder. In other words, to roll the wings level while turning to the left, you must turn the control wheel to the right and press the right rudder.
 - 2. These control pressures should be gradually and smoothly released as the wings become level and the airplane again enters straight-and-level flight.
- D. **Climbs.** To cause the airplane to climb, you must pull back on the control yoke and adjust the throttle to increase the power.
 - 1. To level off from a climb, lower the nose of the airplane by gradually pushing forward on the control yoke.
 - 2. When the airspeed reaches the desired speed, reduce the throttle setting to the appropriate power setting.
- E. **Descents.** The airplane loses altitude in a controlled manner. Reduce power with the throttle and lower the nose by pushing the control yoke forward to maintain the desired airspeed.
 - 1. To end the descent, you should raise the nose to a level attitude and, at the same time, increase power to the desired throttle setting.

After 15 to 20 minutes, your instructor will inform you that it is time to return to the airport. Your instructor will perform the landing and explain what is happening. As you exit from the runway, your instructor may let you have another try at taxiing the airplane.

Once the airplane is parked and secured, and you have all your belongings, your instructor will answer your questions regarding the flight and how to begin flying lessons. Hopefully, you will be able to schedule your first flight lesson. See pages 2 through 5 for a complete discussion of how to proceed.

COST TO OBTAIN YOUR PILOT CERTIFICATE

The price of instruction varies nationwide and also from flight school to flight school. Fuel, maintenance, and airplane expenses play a major role in determining airplane rental rates. Shop around to make sure you are buying what you want at a fair price. Your total cost will depend on the FBO, equipment, local cost factors, competition, etc., and the amount of training you require in excess of 40 hours. Many flight schools allow payments as time progresses, lesson by lesson, instead of all at once. Some flight schools offer discounts for purchasing a block of flight time.

Medical Exam	\$ 70	
Books and Supplies	160	-- Gleim kit plus an aeronautical sectional chart (\$7) and an <i>Airport/Facility Directory</i> (\$4) for your local area.
Knowledge Test Fee	70	
30 Hours of Dual	3,000	-- \$70 per hour (aircraft) and \$30 per hour (instructor).
10 Hours of Solo	700	-- \$70 per hour for airplane rental.
Rental of Aircraft for Flight Test	100	
Practical Test Fee	<u>250</u>	
TOTAL	<u>\$4,350</u>	

Note this is the low end of the cost range. Most pilots require about 55 hours. Gleim's **Private Pilot Syllabus & Logbook** will assist you and your CFI in completing your training in less than 55 hours!

Also, aircraft rental can range from \$35 to \$125 per hour depending on airplane, age, type and equipment installed. Age of the aircraft does NOT imply less reliability.

TIME REQUIRED TO OBTAIN YOUR PILOT CERTIFICATE

While only 40 hours of *flight* time is required for the private pilot certificate, the *total* process usually takes several months and hundreds of hours due to commuting, ground training, aircraft preflight, canceled lessons due to bad weather, airplane maintenance, etc.

A typical chronological order of flying time follows. The numbers on the left are the minimum using our **Private Pilot Syllabus and Logbook**, under Part 61.

14.5 to 16 hours	-- Presolo (dual)
2.0 to 5 hours	-- Solo
5.0 to 7 hours	-- Precross-country (dual)
5.5 to 9 hours	-- Cross-country and night flying (dual)
7.0 to 8 hours	-- Cross-country (solo)
<u>7.0 to 10 hours</u>	-- Preparation for practical (flight) test (dual and solo)
41.0 55	

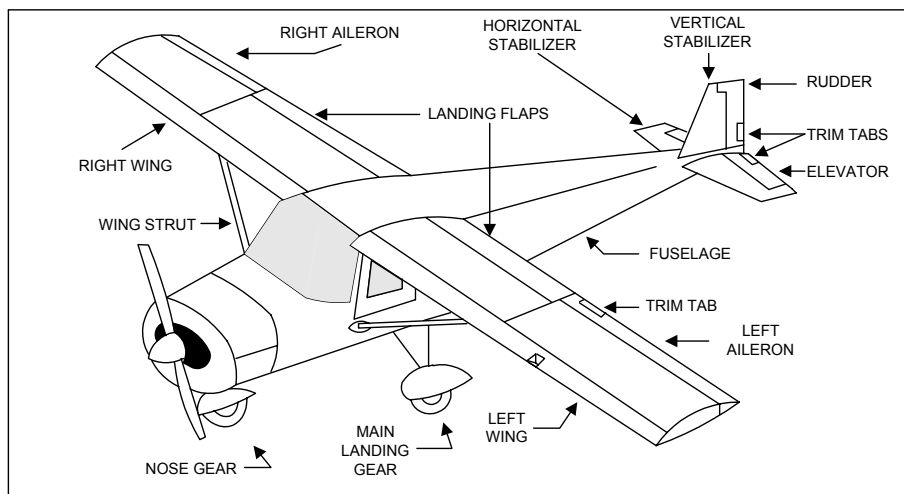
Your pilot certificate can be obtained in as little as a month with near full-time effort. A more realistic timetable is 3 to 4 months. The ideal situation is to fly **at least** 1 to 2 times per week to maintain a higher level of proficiency.

AIRPLANES: HOW THEY FLY

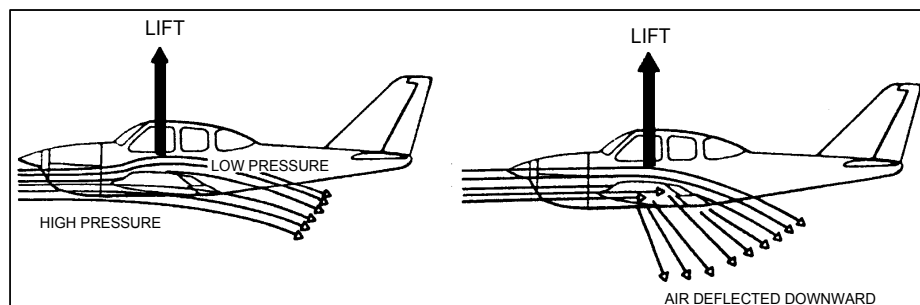
The purpose of the next six pages is to introduce you to the parts of the airplane and to aerodynamics, i.e., the forces acting on the airplane in flight. Remember, this is technical material which will make more sense as you begin your flight lessons.

THE AIRPLANE

The first figure below is a high-wing aircraft, such as a Cessna 152. On low-wing airplanes, such as the Beech Skipper and the Piper Tomahawk, the wings are affixed to the bottom rather than the top of the fuselage, as indicated in the second figure below.

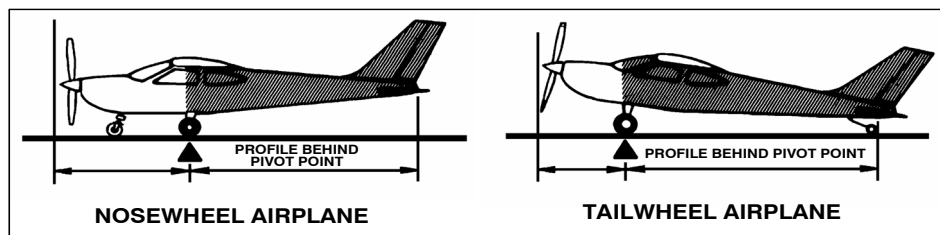


1. **Wing** -- Provides lift by creating a low pressure area on the top of the wing and a high pressure area on the bottom. The top of the wing is curved, which provides a longer distance for air to flow over the wing than under the wing. As the air on top of the wing travels a greater distance in the same amount of time, it moves faster than the air flowing under the wing, which results in less pressure on top than on the bottom of the wing. At the same time, the bottom of the wing deflects air downward, which also produces lift.



2. **Fuselage** -- The main component of the airplane. Its function is to act as a carrier for the wings and tail section. It also is designed to produce a limited amount of lift.
3. **Horizontal stabilizer** -- This structure, located in the rear of the airplane, is designed to provide continuous longitudinal (from front to rear) stability. It prevents uncontrolled up and down movements of the nose (pitching).
4. **Elevator** -- A movable part on the rear of the horizontal stabilizer. It is used to move the airplane about the lateral axis. It provides the input of pitch and helps control altitude. Note the axes of rotation are discussed and illustrated on page 14.

5. **Vertical stabilizer** -- This surface provides directional (right or left) stability. It acts like a weathervane. It prevents uncontrolled left or right movements of the nose (yawing).
6. **Rudder** -- This surface, which is connected to the vertical stabilizer, moves the airplane around its vertical axis and is used to yaw (move the tail to the left or right) the airplane.
7. **Rudder and elevator trim tabs** -- These small, moveable surfaces decrease control pressures and help to establish hands-off flight (i.e., when the airplane will almost fly by itself). All airplanes have elevator trim tabs controllable from the cockpit.
8. **Right and left ailerons** -- These surfaces, located on the outside trailing edges of the wings, control the airplane around its longitudinal axis, i.e., the degree of bank, or whether one wing is higher or lower than the other wing (rolling).
9. **Aileron trim tab** -- This small movable section of one or both ailerons permits adjustment so the wings remain level; i.e., you can compensate for more weight on either side of the airplane. Not all airplanes have Aileron trim tabs.
10. **Landing flaps** -- These surfaces are located on the inside trailing edges of the wings. They can be extended to provide greater wing area at slower speeds. This provides more lift and drag and allows an airplane to land, take off, or fly at slower speeds.
11. **Main landing gear** -- The component of the airplane that touches the runway first during a normal landing. It is designed to take large loads and impacts.
12. **Nose gear** -- This component is designed to steer the airplane on the ground. It is not designed for excessive impacts or loads. However, it is designed to carry the weight of the forward portion of the airplane.
13. **Nosewheel (tricycle) vs. tailwheel (conventional)** -- Nosewheel airplanes have the “third” wheel in front of the main landing gear (i.e., under the nose) as pictured below. Nosewheel airplanes have much better handling (because there is less airplane behind the pivot point) and visibility characteristics while taxiing. Almost all new airplanes are nosewheel design.
 - a. Tailwheel airplanes have the “third” wheel under the tail. Tailwheel airplanes can land on much rougher terrain and, consequently, are used by bush pilots. In a tailwheel airplane, this gear supports the weight of the rear portion of the airplane.



14. **Retractable landing gear** -- Retracting the gear reduces drag and increases airspeed without the need for additional power. The landing gear normally retracts into the wing or fuselage through an opening which may be covered by doors after the gear is retracted. The smooth door will provide for the unrestricted flow of air across the opening that houses the gear. The retraction or extension of the landing gear is accomplished either electrically or hydraulically by landing gear controls from within the cockpit. Warning indicators are usually provided in the cockpit to indicate whether the wheels are extended and locked, or retracted. In nearly all airplanes equipped with retractable landing gear, a system is provided for emergency gear extension in the event landing gear mechanisms fail to lower the gear.

CATEGORIES OF AIRCRAFT

A. The four categories of aircraft and their subdivision into classes are listed below.

1. **Airplanes**

- a. Single-engine land
- b. Multiengine land
- c. Single-engine sea
- d. Multiengine sea

2. **Glinters**

3. **Rotorcraft**

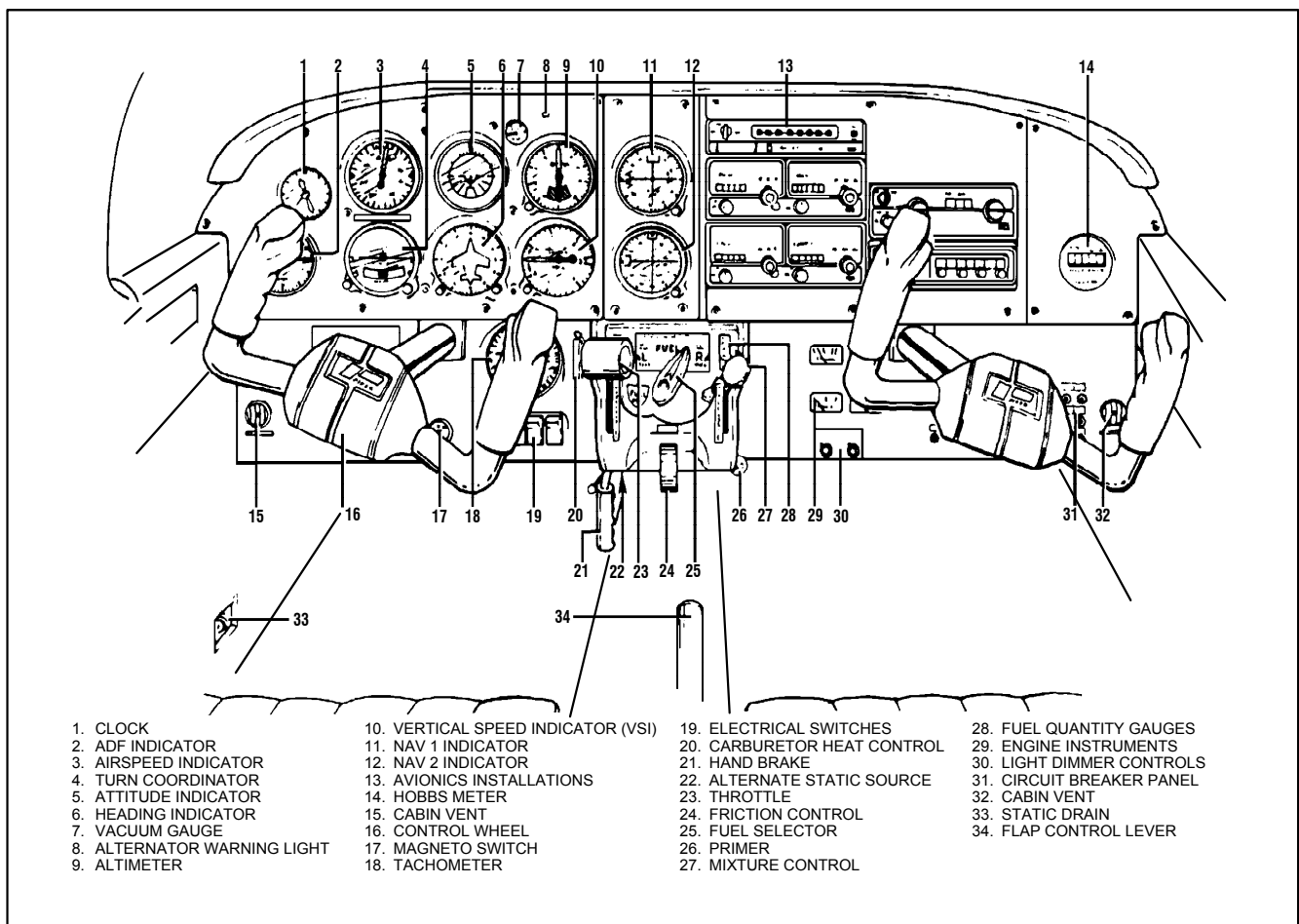
- a. Gyroplanes -- Thrust is provided by a pusher propeller and lift by an unpowered rotorblade.
- b. Helicopter -- Rotorblade is powered to obtain lift and thrust.

4. **Lighter-than-air**

- a. Airship
- b. Gas balloon
- c. Hot air balloon

INSIDE THE AIRPLANE

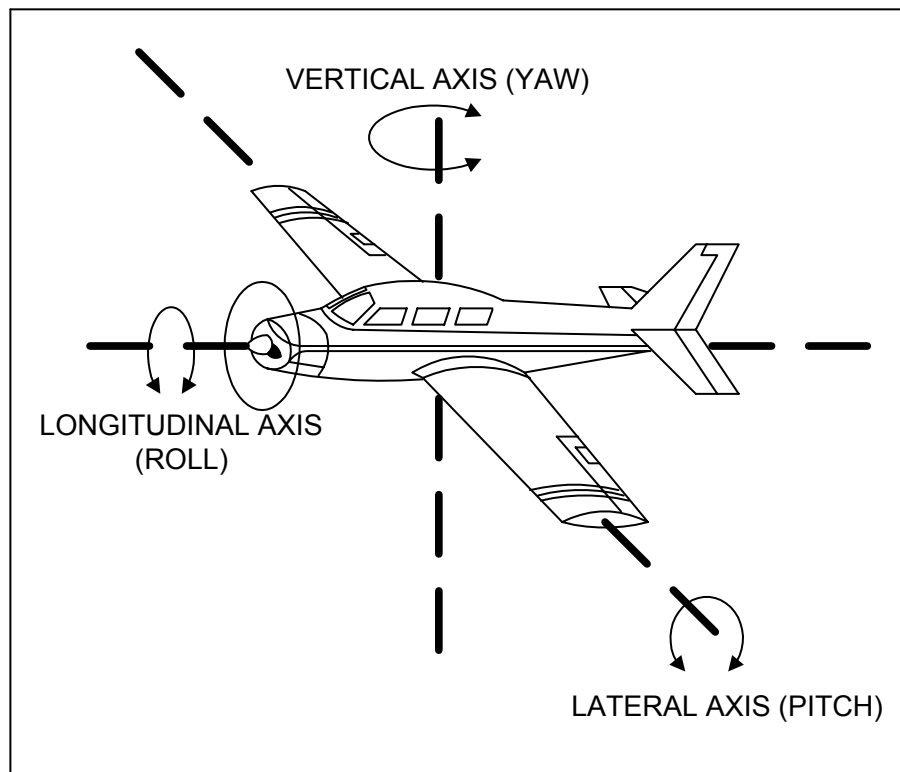
The following is a diagram of a Piper Tomahawk control panel. It may contain more equipment than is found in some trainer-type airplanes used by student pilots.



AXES OF ROTATION

A. The airplane has three axes of rotation around which it moves. See the illustration below.

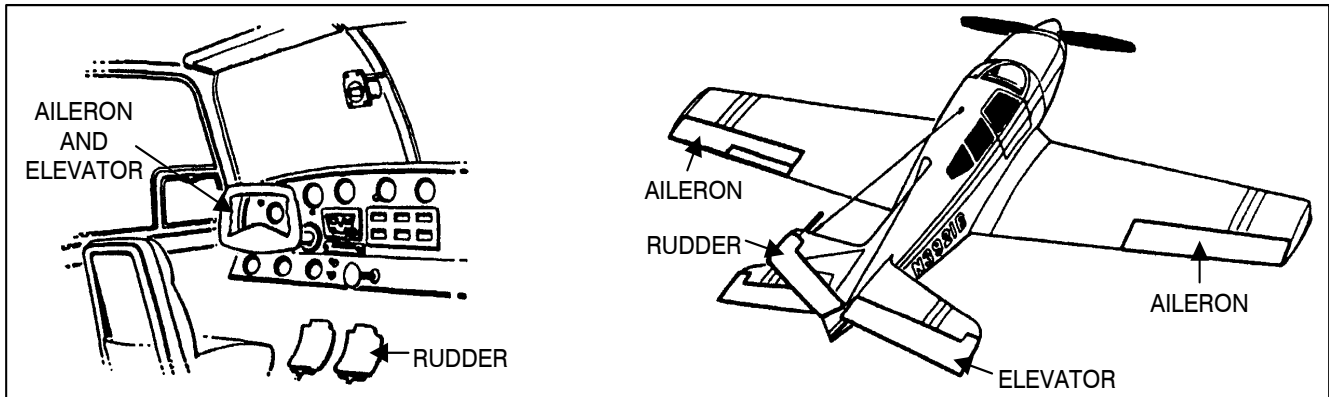
1. **Lateral (pitch) axis** -- an imaginary line from wingtip to wingtip
 - a. Rotation about the lateral axis is called **pitch** and is controlled by the elevator.
 - b. The rotation is similar to a seesaw. The bar holding the seesaw is the lateral axis.
 - c. The angle between the airplane's nose and the horizon is known as the airplane's **pitch attitude**.
2. **Longitudinal (roll) axis** -- an imaginary line from the nose to the tail
 - a. Rotation about the longitudinal axis is called **roll** and is controlled by the ailerons.
 - b. The rotation is similar to a barbecue rotisserie, in which the spit is the longitudinal axis.
 - c. The angle between the airplane's wings and the horizon is known as the airplane's bank.
3. **Vertical (yaw) axis** -- an imaginary line extending vertically through the intersection of the lateral and longitudinal axes
 - a. Rotation about the vertical axis is called **yaw** and is controlled by the rudder. This rotation is referred to as directional control or directional stability.
 - b. The rotation is similar to a weather vane, in which the post holding the vane is the vertical axis.



B. The airplane can rotate around one, two, or all three axes simultaneously. Think of these axes as imaginary axles around which the airplane turns, much as a wheel would turn around axles positioned in these same three directions.

FLIGHT CONTROLS AND CONTROL SURFACES (See the illustration below.)

- A. **Primary Flight Controls.** The airplane is controlled by deflection of flight control surfaces. These are hinged or movable surfaces with which the pilot adjusts the airplane's attitude during takeoff, flight maneuvering, and landing (airplane attitude refers to whether the airplane is pointing up, down, etc.). The flight control surfaces are operated by the pilot through connecting linkage to the rudder pedals and a control yoke.
1. The **control yoke** is similar to the steering wheel of a car. However, you can push and pull it in addition to turning it. The push/pull movement controls the third dimension in which airplanes move (up and down). Remember, a car can only go straight or turn (move in two dimensions), but an airplane can go straight, turn, or move up and down.

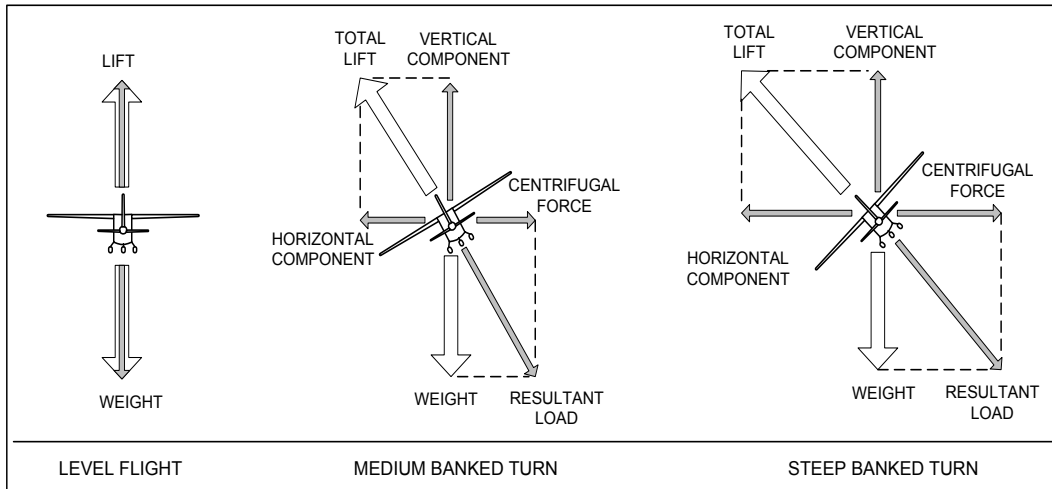


2. The **rudder** is attached to the vertical stabilizer. Controlled by the rudder pedals, the rudder is used by the pilot to control the direction (left or right) of yaw about the airplane's vertical axis for minor adjustments. It is NOT used to make the airplane turn, as is often erroneously believed. Banking the airplane makes it turn. See "How Airplanes Turn" on the following page.
 3. The **elevators** are attached to the horizontal stabilizer. The elevators provide the pilot with control of the pitch attitude about the airplane's lateral axis. The elevators are controlled by pushing or pulling the control yoke.
 4. The outboard movable portions of each wing are the **ailerons**. The term "aileron" means "little wing" in French. Ailerons are located on the trailing (rear) edge of each wing near the outer tips. When deflected up or down, they in effect change the wing's camber (curvature) and its angle of attack. This changes the wing's lift and drag characteristics.
 - a. Their primary use is to bank (roll) the airplane around its longitudinal axis. The banking of the wings results in the airplane turning in the direction of the bank, i.e., toward the direction of the low wing.
 - b. The ailerons are interconnected in the control system to operate simultaneously in opposite directions of each other. As the aileron on one wing is deflected downward, the aileron on the opposite wing is deflected upward.
 - c. The ailerons are controlled by turning the control yoke.
- B. **Secondary Flight Controls.** In addition to primary flight controls, most airplanes have another group called secondary controls. These include trim devices of various types and wing flaps.
1. **Trim tabs** are commonly used to relieve the pilot from maintaining continuous pressure on the primary controls when correcting for an unbalanced flight condition caused by changes in aerodynamic forces or weight.
 2. **Wing flaps** are installed on the wings of most airplanes. Flaps increase both lift and drag and have three important functions:
 - a. First, they permit a slower landing speed, which decreases the required landing distance.

- b. Second, they permit a comparatively steep angle of descent without an increase in speed. This makes it possible to safely clear obstacles when making a landing approach to a small field.
- c. Third, they may also be used to shorten the takeoff distance and provide a steeper climb path.

HOW AIRPLANES TURN

- A. The lift produced by an airplane's wings is used to turn the airplane. When banked, the horizontal component of lift turns the airplane.



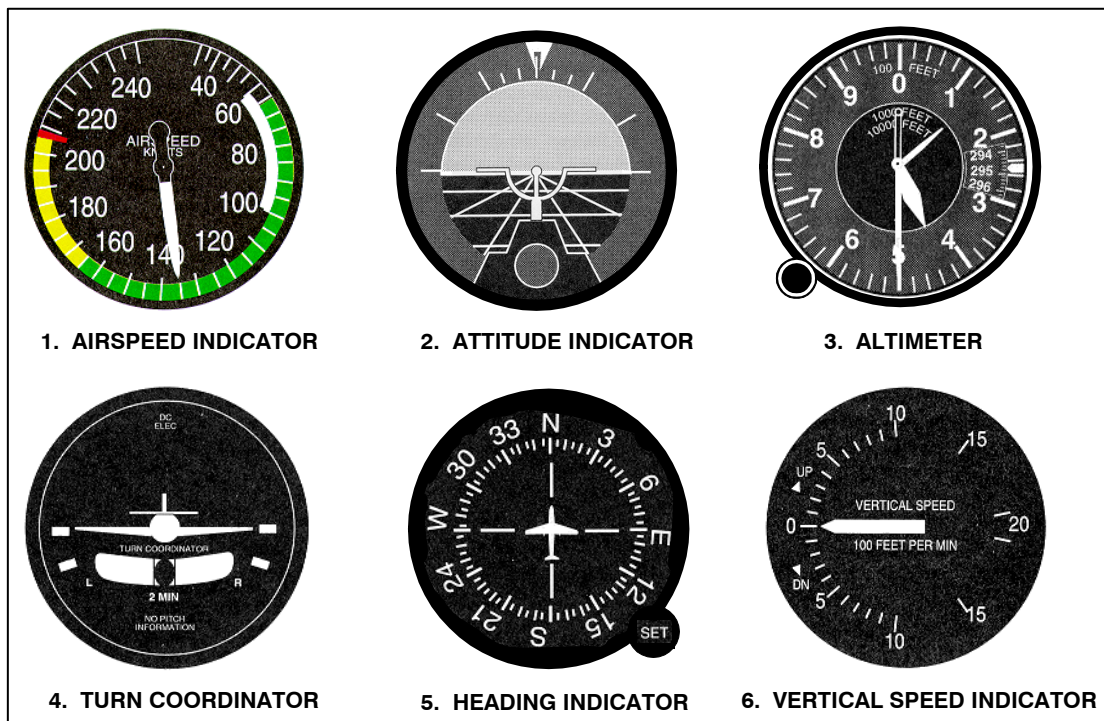
1. Until a force acts on the airplane, it tends to fly straight ahead due to inertia.
 - a. Inertia is the phenomenon observed when moving objects continue to move in the same direction; i.e., they tend not to turn unless acted upon by an outside force.
 2. When the airplane begins to turn, centrifugal force pulls the airplane away from the turn, i.e., tends to make it fly straight ahead.
 3. The horizontal component of lift (in a bank) counteracts the centrifugal force.
 - a. Therefore, the greater the bank, the sharper the turn or the greater the rate of turn because more of the total lift goes into the horizontal component.
 4. The rudder does not turn the airplane. It controls the yaw about the vertical axis.
 - a. This permits the "coordination" of the rudder and ailerons.
 - b. **Coordinated flight** is when the airplane goes "straight ahead" through the relative wind.
- B. In a bank, the total lift consists of both horizontal lift (counteracting centrifugal force) and vertical lift (counteracting weight and gravity).
1. Therefore, given the same amount of total lift, there is less vertical lift in a bank than in straight-and-level flight.
 2. Thus, to maintain altitude in a turn, you must
 - a. Increase back pressure on the control yoke (for a higher angle of attack to produce more lift), and/or
 - b. Increase power.
- C. The turn is stopped by decreasing the bank to zero (i.e., wings level).

BASIC FLIGHT MANEUVERS

In this section, we will provide you with more detailed information on the basic flight maneuvers (straight-and-level, turns, climbs, and descents). Do not feel overwhelmed by the material. Just read and try to understand the basic concepts and write down questions to ask your instructor. At the beginning of each flight lesson, your instructor will sit down with you to go over what you will do during the lesson. This is called a preflight briefing. It is a discussion between you and your CFI that should answer all of your questions. Your home study before the lesson will reduce the time spent on the preflight briefing and provide you with quality flight training time -- all of which will help keep costs down.

FLIGHT INSTRUMENTS

- A. When you are sitting in the airplane, you will notice six flight instruments in front of you. Your instructor will refer to these instruments. The typical arrangement of these instruments is shown below.



1. The airspeed indicator (ASI) displays the speed at which the airplane is moving through the air. The ASI in the figure is indicating an airspeed of 135 knots.
2. The attitude indicator (AI) displays the attitude of the airplane (nose up, nose down, wings banked) in relation to the horizon. The AI in the figure is indicating level flight (nose and wings are level in relation to the horizon).
3. The altimeter (ALT) displays the altitude of the airplane above mean sea level (MSL) when properly adjusted to the current pressure setting. The ALT in the figure is indicating an altitude of 14,500 ft. MSL.

4. The turn coordinator (TC) displays the rate at which a turn is being made. The miniature airplane banks in the direction of the turn. At the bottom of the instrument is a ball in a glass tube called an inclinometer. The inclinometer indicates whether the airplane is in coordinated flight (ball centered) or uncoordinated flight. The TC in the figure is indicating wings level and coordinated flight.
5. The heading indicator (HI) displays the heading (direction) the airplane is flying. The HI in the figure is indicating a heading of north.
6. The vertical speed indicator (VSI) displays whether the airplane is in level flight, climbing, or descending. The rate of climb or descent is indicated in hundreds of feet per minute. The VSI in the figure indicates level flight.

AIRPLANE CONTROL

- A. Airplane control is composed of three components: pitch control, bank control, and power control.
 1. **Pitch control** is the control of the airplane about its lateral axis (i.e., wingtip to wingtip) by applying elevator pressure to raise or lower the nose, usually in relation to the horizon.
 2. **Bank control** is the control of the airplane about its longitudinal axis (i.e., nose to tail) by use of the ailerons to attain the desired angle of bank in relation to the horizon.
 3. **Power control** is the control of power or thrust by use of the throttle to establish or maintain a desired airspeed, climb rate, or descent rate in coordination with the attitude changes.
 4. For additional information on the flight controls and control surfaces, see page 15.
- B. The objectives of the following basic flight maneuvers are
 1. To learn the proper use of the flight controls for maneuvering the airplane
 2. To attain the proper attitude in relation to the horizon by use of visual and instrument references
 3. To emphasize the importance of dividing your attention and constantly checking all reference points while looking for other traffic

STRAIGHT-AND-LEVEL FLIGHT

- A. Straight-and-level flight means that a constant heading and altitude are maintained.
 1. It is accomplished by making corrections for deviations in direction and altitude from unintentional turns, descents, and climbs.
- B. The pitch attitude for **level flight** (i.e., constant altitude) is obtained by selecting some portion of the airplane's nose or instrument glare shield as a reference point and then keeping that point in a fixed position relative to the horizon.
 1. That position should be cross-checked occasionally against the altimeter to determine whether or not the pitch attitude is correct for the power setting being used.
 - a. If altitude is being lost or gained, the pitch attitude should be readjusted in relation to the horizon, and then the altimeter should be checked to determine if altitude is being maintained.
 2. The application of forward or back elevator pressure is used to control this attitude.
 3. The pitch information obtained from the attitude indicator will also show the position of the nose relative to the horizon.

- C. To achieve **straight flight** (i.e., constant heading), you should select two or more outside visual reference points directly ahead of the airplane (e.g., roads, section lines, towns, lakes, etc.) to form an imaginary line and then keep the airplane headed along that line.
 - 1. While using these references, you should occasionally check the heading indicator (HI) to determine that the airplane is maintaining a constant heading.
 - 2. Both wingtips should be equidistant above or below the horizon (depending on whether your airplane is a high-wing or low-wing type). Any necessary adjustment should be made with the ailerons to return to a wings level flight attitude.
 - 3. The attitude indicator (AI) should be checked for small bank angles, and the HI should be checked to note deviations from the desired direction.
- D. Straight-and-level flight requires almost no application of control pressure if the airplane is properly trimmed and the air is smooth.
 - 1. Trim the airplane so it will fly straight and level without constant assistance.
 - a. This is called “hands-off flight.”
 - b. Improper trim technique usually results in flying that is physically tiring, particularly in prolonged straight-and-level flight.
 - 2. The airplane should be trimmed by first applying control pressure to establish the desired attitude, and then adjusting the trim so that the airplane will maintain that attitude without control pressure in hands-off flight.
- E. The airspeed will remain constant in straight-and-level flight with a constant power setting.
 - 1. Significant changes in airspeed (e.g., power changes) will require considerable changes in pitch attitude to maintain altitude.
 - 2. Pronounced changes in pitch attitude will also be necessary as the flaps and landing gear (if retractable) are operated.

URNS

- A. A turn is a basic flight maneuver used to change from, or return to, a desired heading. This maneuver involves the coordinated use of the ailerons, rudder, and elevator.
- B. To enter a turn, you should simultaneously turn the control wheel (i.e., apply aileron control pressure) and apply rudder pressure in the desired direction.
 - 1. The speed (or rate) at which your airplane rolls into a bank depends on the rate and amount of control pressure you apply.
 - a. The amount of bank depends on how long you keep the ailerons deflected.
 - 2. Rudder pressure must be enough to keep the ball of the inclinometer (part of the turn coordinator) centered.
 - a. If the ball is not centered, “step on the ball” to recenter it.
 - b. **EXAMPLE:** If the ball is to the right, apply right rudder pressure (i.e., step on the ball) to recenter it.
 - 3. The best outside reference for establishing the degree of bank is the angle made by the top of the engine cowl or the instrument panel with respect to the horizon.
 - a. Since on most light airplanes the engine cowl is fairly flat, its angle relative to the horizon will give some indication of the approximate degree of bank.

4. Information obtained from the attitude indicator (AI) will show the angle of the wings in relation to the horizon. Referring to this information will help you learn to judge the degree of bank based on outside references.
- C. The lift produced by the wings is used to turn the airplane, as discussed in “How Airplanes Turn,” on page 16.
 1. To maintain a constant altitude, you will need to apply enough back elevator pressure (i.e., raise the nose of the airplane in order to increase the angle of attack) to prevent a descent.
- D. As the desired angle of bank is established, aileron and rudder pressures should be released. The bank will not continue to increase since the aileron control surfaces will be neutral in their streamlined position.
 1. The back elevator pressure should not be released but should be held constant or sometimes increased to maintain a constant altitude.
 2. Throughout the turn, you should cross-check the outside references and occasionally include the altimeter to determine whether the pitch attitude is correct.
 3. If you are gaining or losing altitude, adjust the pitch attitude in relation to the horizon, and then recheck the altimeter and vertical speed indicator to determine if altitude is now being maintained.
- E. The roll-out from a turn to straight flight is similar to the roll-in to the turn from straight flight except that control pressures are used in the opposite direction. Aileron and rudder pressures are applied in the direction of the roll-out (i.e., toward the high wing).
 1. As the angle of bank decreases, the elevator pressure should be released smoothly as necessary to maintain altitude. Remember, when the airplane is no longer banked, the vertical component of lift increases.
 2. Since the airplane will continue turning as long as there is any bank, the roll-out must be started before reaching the desired heading.
 - a. The time the roll-out should begin, in order to lead the desired heading, will depend on the rate of turn and the rate at which the roll-out will be made.
 3. As the wings become level, the control pressures should be gradually and smoothly released so that the controls are neutralized as the airplane resumes straight-and-level flight.
 4. As the roll-out is completed, attention should be given to outside visual references as well as to the attitude indicator and heading indicator to determine that the wings are leveled precisely and that the turn is stopped.

CLIMBS

- A. Climbs and climbing turns are basic flight maneuvers in which the pitch attitude and power setting result in a gain in altitude. In a straight climb, the airplane gains altitude while traveling straight ahead. In climbing turns, the airplane gains altitude while turning.
- B. To enter the climb, simultaneously advance the throttle and apply back elevator pressure.
 1. As the power is increased to the climb setting, the airplane's nose will tend to rise to the climb attitude.
 - a. In most trainer-type airplanes, the climb setting will be full power.

2. While the pitch attitude increases and airspeed decreases, progressively more right-rudder pressure must be used to compensate for torque effects and to maintain direction.
 - a. Because the angle of attack is relatively high, the airspeed is relatively slow, and the power setting is high, the airplane will have a tendency to roll and yaw to the left due to turning tendencies created by the rotating propeller.
 - 1) While right-rudder pressure will correct for the yaw, some aileron pressure may also be required to keep the wings level.
- C. When the climb is established, back elevator pressure must be maintained to keep the pitch attitude constant.
 1. As the airspeed decreases, the elevators may try to return to their streamlined or neutral position, which will cause the nose to lower.
 - a. Nose-up trim will therefore be required.
 2. You will need to cross-check the airspeed indicator (ASI) because you want to climb at a specific airspeed and because the ASI will provide an indirect indication of the pitch attitude.
 - a. If the airspeed is higher than desired, you need to raise the nose.
 - b. If the airspeed is lower than desired, you need to lower the nose.
 3. After the climbing attitude, power setting, and airspeed have been established, trim the airplane to relieve all pressures from the controls.
 - a. If further adjustments are made in pitch, power, and/or airspeed, you must retrim the airplane.
 4. If a straight climb is being performed, you need to maintain a constant heading with the wings level.
 - a. If a climbing turn is being performed, maintain a constant angle of bank.
- D. To return to straight-and-level flight from a climbing attitude, you should start the level-off below the desired altitude in order to avoid climbing through it.
 1. To level off, the nose should be lowered.
 2. The nose must be lowered gradually, however, because a loss of altitude will result if the pitch attitude is decreased too abruptly before allowing the airspeed to increase adequately.
 - a. As the nose is lowered, retrim the airplane.
 - b. When the airspeed reaches the desired cruise speed, reduce the throttle setting to appropriate cruise power setting and trim the airplane.
- E. **Climbing Turns.** The following factors should be considered:
 1. With a constant power setting, the same pitch attitude and airspeed cannot be maintained in a bank as in a straight climb due to the decrease in the vertical lift and airspeed during a turn.
 - a. The loss of vertical lift becomes greater as the angle of bank is increased, so shallow turns may be used to maintain an efficient rate of climb. If a medium- or steep-banked turn is used, the airplane's rate of climb will be reduced.
 - b. The airplane will have a greater tendency towards nose heaviness than in a straight climb, due to the decrease of vertical lift.
 2. As in all maneuvers, attention should be divided among all references equally.

- F. There are two ways to establish a climbing turn: either establish a straight climb and then turn, or establish the pitch and bank attitudes simultaneously from straight-and-level flight.
1. The second method is usually preferred because you can more effectively check the area for other aircraft while the climb is being established.

DESCENTS

- A. A descent is a basic maneuver in which the airplane loses altitude in a controlled manner. Descents can be made
1. With partial power, as used during an approach to a landing
 2. Without power, i.e., a glide
 3. At cruise airspeeds, during en route descents
- B. To enter a descent, you should first apply carburetor heat (if recommended by the manufacturer) and then reduce power to the desired setting or to idle.
1. Maintain a constant altitude by applying back elevator pressure as required until the airspeed decreases to the desired descent airspeed.
 2. Once the descent airspeed has been reached, lower the pitch attitude to maintain that airspeed and adjust the trim.
- C. When the descent is established, cross-check the airspeed indicator (ASI) to ensure that you are descending at the desired airspeed.
1. If the airspeed is higher than desired, slightly raise the nose and allow the airspeed to stabilize in order to confirm the adjustment.
 2. If the airspeed is lower than desired, slightly lower the nose and allow the airspeed to stabilize.
 3. Once you are descending at the desired airspeed, note the position of the airplane's nose relative to the horizon and the indications of the attitude indicator (AI).
 - a. Trim the airplane to relieve all control pressures.
 4. Maintain either straight or turning flight, as desired.
- D. The level-off from a descent must be started before reaching the desired altitude in order to avoid descending through it.
1. To level off, you should simultaneously raise the nose to a level attitude and increase power to the desired cruise setting.
 - a. The addition of power and the increase in airspeed will tend to raise the nose. You will need to apply appropriate elevator control pressure and make a trim adjustment to relieve the control pressures.
- E. **Turning Descents**
1. As with climbing turns, you can either enter the turn after the descent has been established or simultaneously adjust the bank and pitch attitudes.
 2. At a desired power setting during a descending turn, maintain airspeed with pitch as you would in a straight descent.

ADVANCED PILOT TRAINING

THE INSTRUMENT RATING

An instrument rating is added to your private or commercial pilot certificate upon satisfactory completion of your training program, a pilot knowledge test, and a practical test. Your private or commercial pilot certificate will look the same except it will have the words “Instrument Airplane” typed on the certificate under the ratings section.

As the title implies, an instrument rating permits you to fly “by instruments,” i.e., without visual references to the ground, horizon, and other landmarks. You will be able to fly through clouds, rain, fog, etc., all of which restrict visibility. This skill is particularly useful when you fly long distances, e.g., over 300-500 NM. It is frequently difficult to travel over 300-500 NM without encountering weather systems with bad weather requiring instrument pilot skills. Similarly, if you must make a flight at a specific time, it may be possible only under instrument flight rules (IFR) due to adverse weather conditions.

REQUIREMENTS TO OBTAIN AN INSTRUMENT RATING (Part 61)

1. Hold at least a private pilot certificate
2. Be able to read, speak, write, and converse fluently in English
3. Hold at least a current third-class FAA medical certificate
4. Flight experience
 - a. 50 hours as pilot in command on cross-country flight (of which 10 hours must be in airplanes) to airports more than 50 NM from the original departure point.
 - b. 40 hours of simulated or actual instrument time (of which up to 20 hours can be in a flight simulator or flight training device; up to 10 hours can be in a personal computer-based aviation training device).
 - c. 15 hours of instrument flight instruction in an airplane. This must be with a CFII (a CFI who has been certificated to instruct instrument flight).
5. Appropriate ground instruction (such as studying Gleim’s ***Instrument Pilot FAA Written Exam*** and using ***FAA Test Prep*** software) to learn
 - a. FARs applicable to instrument pilots
 - b. IFR navigation
 - c. Aviation weather
 - d. Safe and efficient flying skills applicable to IFR
 - e. Aeronautical decision making and judgment

6. A score of 70% or better on the pilot knowledge test. The test consists of 60 multiple-choice questions selected from the approximately 900 airplane-related questions in the FAA instrument rating test bank. Each of the FAA's airplane questions is reproduced (with complete explanations to the right of each question) in ***Instrument Pilot FAA Written Exam***. The questions test the following 11 topics:
 - a. Airplane Instruments
 - b. Attitude Instrument Flying and Aerodynamics
 - c. Navigation Systems
 - d. Federal Aviation Regulations
 - e. Airports, Air Traffic Control, and Airspace
 - f. Holding and Instrument Approaches
 - g. Aeromedical Factors
 - h. Aviation Weather
 - i. Aviation Weather Services
 - j. IFR En Route
 - k. IFR Flights
7. Flight instruction and development of the necessary skills to pass the instrument rating practical test. Your instrument instructor must provide a signed recommendation that you are competent as an instrument pilot.
8. Successful completion of the FAA Instrument Rating Practical Test. The FAA requires the following 24 tasks to be tested.
 - a. Preflight Preparation
 - 1) Weather Information
 - 2) Cross-Country Flight Planning
 - b. Preflight Procedures
 - 1) Aircraft Systems Related to IFR Operations
 - 2) Aircraft Flight Instruments and Navigation Equipment
 - 3) Instrument Cockpit Check
 - c. Air Traffic Control Clearances and Procedures
 - 1) Air Traffic Control Clearances
 - 2) Compliance with Departure, En Route, and Arrival Procedures and Clearances
 - 3) Holding Procedures
 - d. Flight by Reference to Instruments
 - 1) Straight-and-Level Flight
 - 2) Change of Airspeed
 - 3) Constant Airspeed Climbs and Descents
 - 4) Rate Climbs and Descents
 - 5) Timed Turns to Magnetic Compass Headings
 - 6) Steep Turns
 - 7) Recovery from Unusual Flight Attitudes
 - e. Navigation Systems
 - 1) Intercepting and Tracking Navigational Systems and DME Arcs
 - f. Instrument Approach Procedures
 - 1) Nonprecision Instrument Approach
 - 2) Precision ILS Instrument Approach
 - 3) Missed Approach
 - 4) Circling Approach
 - 5) Landing from a Straight-In or Circling Approach
 - g. Emergency Operations
 - 1) Loss of Communications
 - 2) Loss of Gyro Attitude and/or Heading Indicators
 - h. Postflight Procedures
 - 1) Checking Instruments and Equipment

COST OF YOUR INSTRUMENT RATING

Remember that you must have 50 hours of cross-country time as pilot in command flying to airports more than 50 NM from the departure point. Rental rates for IFR-certified airplanes range from \$50 to \$100 per hour. Instrument instruction will cost about \$30 to \$40 per hour for your instructor (you are required to have 15 hours, but plan on at least 30 hours). If you go to a typical FBO, you will probably spend \$4,000 to \$5,000. As we recommended prospective private pilots, you should discuss the cost with potential CFIs. After you select a specific program, develop a budget with your CFI and review your progress periodically.

Once you have your private pilot certificate, it may be in your interest to purchase an IFR-equipped airplane or gain use of one through a flying club. For IFR certification, you need a full panel, which includes an attitude indicator, a heading indicator, a turn coordinator, and IFR-certified navigation equipment. As you are building cross-country hours toward your instrument rating, you should work on your instrument skills. It is more effective to proceed under the supervision of a CFI (flight instructor-instrument) than to try to do it entirely on your own.

1. *Ground trainers and Personal Computer-Based Aviation Training Devices (PCATDs).* There are several IFR flight simulators and Flight Training Devices that have been marketed widely to colleges, FBOs, etc., as well as more-affordable PCATDs. If you can gain access to one, use it under the supervision of a CFI who will sign off these hours in your logbook. Remember, up to 20 of the 40 hours of required IFR experience and 10 of the 15 hours of required instrument instruction may be in a flight simulator or a flight training device (only 10 of the required 40 hours of instrument time may be obtained in a PCATD).
2. *Safety pilots.* Once you have your private pilot certificate you can practice your instrument skills by using a "hood" (a view-limiting device so you can see your instruments but not outside of the airplane). **At all times** when you fly under the hood, you **must** have a safety pilot next to you watching for traffic. A safety pilot is appropriately rated to fly your airplane and is required by the FARs to look primarily for other air traffic (a midair collision would ruin your day). A safety pilot also can take over the controls if you get the airplane into an unusual attitude, i.e., if it begins to get out of control.

STEPS TO TAKE

1. Order Gleim's *Instrument Pilot Kit* (see the order form on page 32).
2. Take and pass the FAA pilot knowledge test (you need to answer 42 of the 60 FAA test questions correctly in order to pass). Use Gleim's *Instrument Pilot FAA Written Exam* and Gleim's *FAA Test Prep* software.
 - a. Read the Introduction, titled The FAA Pilot Knowledge Test, carefully.
 - b. For each of the 11 chapters,
 - 1) Study the outline at the beginning of the chapter.
 - 2) Read each FAA test question carefully and select the best answer.
 - 3) Check your answer with the correct answer next to each question.
 - 4) Read and understand our explanation of the question.
3. Study Gleim's *Instrument Pilot Flight Maneuvers and Practical Test Prep*. Understand each aspect of IFR flight before you practice it in an airplane.
4. Pursue a flight instruction program with a CFI. When selecting a CFI, consider the suggestions on how to select a CFI (presented on page 5 of this booklet). One additional question to ask is how much actual IFR experience the CFI has. Another question is whether (s)he uses a simulator as a regular training tool.
5. Take and pass your practical test!

THE COMMERCIAL PILOT CERTIFICATE

A commercial pilot certificate is identical to your private pilot certificate except that it allows you to fly an airplane and carry passengers and/or cargo for compensation or hire. The certificate will be sent to you by the FAA upon satisfactory completion of your training program, a pilot knowledge test, and a practical test. Your commercial pilot certificate will be identical to your private pilot certificate except it will indicate “commercial pilot” rather than “private pilot.”

If you obtain your commercial pilot certificate before you obtain your multiengine rating, your multiengine rating practical test will be based on the commercial practical test standards, giving you a commercial pilot multiengine rating rather than a private pilot multiengine rating.

REQUIREMENTS TO OBTAIN A COMMERCIAL PILOT CERTIFICATE

1. Be at least 18 years of age.
2. Be able to read, speak, write, and converse fluently in English.
3. Hold at least a current third-class FAA medical certificate.
4. A score of 70% or better on the pilot knowledge test. The test consists of 100 multiple-choice questions selected from the approximately 600 airplane-related questions in the FAA commercial pilot test bank. Each of the FAA's airplane questions is reproduced with complete explanations to the right of each question in Gleim's **Commercial Pilot FAA Written Exam**. The questions test the following 11 topics:
 - a. Airplanes and Aerodynamics
 - b. Airplane Instruments, Engines, and Systems
 - c. Airports, Air Traffic Control, and Airspace
 - d. Federal Aviation Regulations
 - e. Airplane Performance and Weight and Balance
 - f. Aeromedical Factors and Aeronautical Decision Making (ADM)
 - g. Aviation Weather
 - h. Aviation Weather Services
 - i. Navigation: Charts, Publications, Flight Computers
 - j. Navigation Systems
 - k. Flight Operations
5. Flight experience. A total of 250 hours of pilot flight time is required (with no more than 50 hours in a flight simulator or flight training device). This must include the following:
 - a. 100 hours in powered aircraft, of which 50 hours must be in airplanes
 - b. 100 hours as pilot in command flight time, which includes at least
 - 1) 50 hours in airplanes
 - 2) 50 hours in cross-country flight, of which 10 hours must be in airplanes
 - c. 20 hours of flight training that includes at least
 - 1) 10 hours of instrument training of which at least 5 hours must be in an airplane (not needed if you already hold an instrument rating)
 - 2) 10 hours of training in an airplane that has a retractable landing gear, flaps, and controllable-pitch propeller, or is turbine-powered

- 3) One cross-country flight of at least 2 hours in an airplane in day-VFR conditions, consisting of a total straight-line distance of more than 100 NM from the original point of departure
 - 4) One cross-country flight of at least 2 hours in an airplane in night-VFR conditions, consisting of a straight-line distance of more than 100 NM from the original point of departure
 - 5) 3 hours in an airplane in preparation for the practical test within the 60 days preceding the test
 - d. 10 hours of solo flight in an airplane, which includes at least
 - 1) One cross-country flight of not less than 300 NM total distance, with landings at a minimum of three points, one of which is a straight-line distance of at least 250 NM from the original departure point
 - a) In Hawaii, the longest segment need have only a straight-line distance of at least 150 NM.
 - 2) 5 hours in night-VFR conditions with 10 takeoffs and 10 landings (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower
6. Hold an instrument rating. A commercial pilot is presumed to have an instrument rating. If not, his/her commercial pilot certificate will be endorsed with a prohibition against carrying passengers for hire on day VFR flights beyond 50 NM **or** at night.
7. You must receive and log ground and flight training from an authorized instructor in the following areas of operations for an airplane.
 - a. *Preflight preparation*
 - b. *Preflight procedures*
 - c. *Airport operations*
 - d. *Takeoffs, landings, and go-arounds*
 - e. *Performance maneuvers*
 - f. *Ground reference maneuver*
 - g. *Navigation*
 - h. *Slow flight and stalls*
 - i. *Emergency operations*
 - j. *High-altitude operations*
 - k. *Postflight procedures*
8. Successful completion of an FAA practical test that will be given as a final exam. The practical test will be conducted as specified in the FAA's Practical Test Standards. The maneuvers tested are the same as the maneuvers tested on the private practical test except five additional proficiency flight maneuvers are required: chandelles, eights on pylons, lazy eights, steep spirals, and a power-off precision landing. Two additional knowledge tasks are required: supplemental oxygen and pressurization. Obtain and study Gleim's ***Commercial Pilot Flight Maneuvers and Practical Test Prep***. It contains a reprint of tasks required on the commercial pilot practical test with a complete discussion and illustrations.

THE FLIGHT INSTRUCTOR CERTIFICATE

A flight instructor certificate allows you to give flight and ground training, i.e., to teach others to fly. An individual who wishes to have a career as a pilot typically earns the private, commercial, and flight instructor certificates (and an instrument rating). As a Certificated Flight Instructor (CFI), you can work as a flight instructor and get paid, rather than pay, for additional flight experience. After obtaining your CFI certificate, the next major step is the airline transport pilot (ATP) certificate, which requires 1,500 hours of flight time and a minimum age of 23.

REQUIREMENTS TO BECOME A CERTIFICATED FLIGHT INSTRUCTOR (CFI)

1. Be at least 18 years of age.
2. Be able to read, write, and converse fluently in English.
3. Hold a commercial or ATP certificate.
 - a. Hold an instrument rating if applying to be a flight instructor in an airplane
4. Hold at least a current third-class FAA medical certificate.
5. A score of 70% or better on the FAA flight instructor knowledge test. The flight instructor test consists of 100 multiple-choice questions selected from the airplane-related questions in the FAA flight and ground instructor test bank. Each of the FAA's airplane questions is reproduced with complete explanations to the right of each question in Gleim's ***Flight/Ground Instructor FAA Written Exam***. The questions test the following topics:
 - a. Airplanes and Aerodynamics
 - b. Airplane Performance
 - c. Airplane Instruments, Engines, and Systems
 - d. Airports, Airspace, and ATC
 - e. Weight and Balance
 - f. Aviation Weather
 - g. Federal Aviation Regulations
 - h. Navigation
 - i. Flight Maneuvers
 - j. Aeromedical Factors
6. A passing score on the FAA fundamentals of instructing knowledge test. It consists of 50 multiple-choice questions taken from approximately 200 questions. Gleim's ***Fundamentals of Instructing FAA Written Exam*** and ***FAA Test Prep*** software consist of a complete study program including all questions appearing on the FAA knowledge test. The questions test the following topics:
 - a. The Learning Process
 - b. Barriers to Learning
 - c. Human Behavior and Effective Communication
 - d. Teaching Methods
 - e. Planning Instructional Activity
 - f. Critique and Evaluation

7. Required flight instruction

- a. You must receive and log flight and ground training and obtain a logbook endorsement from an authorized instructor on the following areas of operations for an airplane category rating with a single-engine or multiengine class rating.
 - 1) *Fundamentals of instructing*
 - 2) *Technical support areas*
 - 3) *Preflight preparation*
 - 4) *Preflight lesson on a maneuver to be performed in flight*
 - 5) *Preflight procedures*
 - 6) *Airport operations*
 - 7) *Takeoffs, landings, and go-arounds*
 - 8) *Fundamentals of flight*
 - 9) *Performance maneuvers*
 - 10) *Ground reference maneuvers*
 - 11) *Slow flight, stalls, and spins*
 - 12) *Basic instrument maneuvers*
 - 13) *Emergency operations*
 - 14) *Postflight procedures*
 - b. The flight instruction must be given by a person who has held a flight instructor certificate during the 24 months immediately preceding the date the instruction is given and who has given at least 200 hours of flight instruction as a CFI.
 - c. You must also obtain a logbook endorsement by an appropriately certificated and rated flight instructor who has provided you with spin entry, spin, and spin recovery training in an airplane that is certificated for spins and has found you instructionally competent and proficient in those training areas, i.e., so you can teach spins.
8. Successful completion of a practical test that will be given as a final exam by an FAA inspector on the topics listed above. All of the tasks for the CFI are thoroughly explained as well as reprinted in Gleim's ***Flight Instructor Flight Maneuvers and Practical Test Prep***, which will provide you with step-by-step instructions for each flight maneuver. The flight portion of the practical test consists largely of those maneuvers tested on the commercial practical test except you must explain each maneuver to the examiner as you are flying the airplane. During the practical test, you will fly the airplane from the right seat because this is where CFIs instruct (with the student in the left seat).

CERTIFICATED FLIGHT INSTRUCTOR - INSTRUMENT (CFII)

In order to instruct pilots working toward their instrument rating, you must be an instrument instructor, which requires more training, another pilot knowledge test, and a practical test. The FAA pilot knowledge test consists of 50 questions from the same questions used on the FAA pilot knowledge test for the instrument rating; i.e., you (in effect) retake your instrument rating knowledge test. Thus, you need to study Gleim's ***Instrument Pilot FAA Written Exam***. The practical test consists of the instrument rating practical test maneuvers except you must explain the maneuvers as you perform them and you sit in the right seat. Gleim's ***Instrument Pilot Flight Maneuvers and Practical Test Prep*** is an essential text to help you prepare for your CFII practical test.

CFIs NOTE: This is an excellent IFR refresher and update. Another major advantage is that passage of the flight test extends your CFI privileges for another 24 months; i.e., the additional rating both renews your CFI certificate and satisfies the flight review requirement.

TYPICAL COMMENTS ABOUT GLEIM PRODUCTS

Dear Dr. Gleim:

I have used Gleim Products for study on my Private Pilot Certificate and Instrument Rating. I can readily say that, of the references used for my aviation career to date, if I had to advise someone starting out, they should start by purchasing the Gleim books and software. Not only were the test prep books and software my primary study source (receiving 100% on the Private written, 98% on Instrument written), but the Practical test maneuver books were also my primary source of study for the flight tests (not only were both of my flight tests successful the first time, but I felt quite comfortable taking them).

Jim Maguire

Dear Dr. Gleim:

I purchased the Gleim private pilot kit in December of 1999. I began studying for my private pilot exam the day I got the kit and software. I am pleased to say that in February of 2000 I took the FAA exam and scored a 97%. This was all due to the studying I did from the Gleim private pilot kit and no official ground school. I took and passed the exam before I ever began any flight training or ground school! My instructor was quite impressed with the fact that I had already accomplished what most students wait until the end to do. Thanks to Dr. Gleim for putting out a product that helped me obtain this kind of score.

Jim Hickman

Dear Dr. Gleim:

I've used Gleim materials to get me from student to instructor, so it was natural for me to turn to Gleim when I started instructing. I've been using the Gleim Private Pilot Syllabus and Logbook since I started instructing. It is an invaluable aid to organizing the process of getting from student to pilot. It has given me a lot of confidence as a rookie instructor. Without the Syllabus it's easy not to include or review some of the less romantic PTS.

Checkrides are tougher than ever, and with the Syllabus, I know exactly what the student's done and how well he's performed. It's particularly invaluable for start and stop students. We all have those students who stop flying, sometimes for months, and show up later, ready to go again. With the Syllabus it's much easier for me to pick up at the logical point. Thanks Dr. Gleim.

Eric Dahl, CFIA
Oxford, MS



The **KEY TO SUCCESS** in your flight training, which also minimizes cost and frustration, is your study and preparation at home before flying with your flight instructor. The more you know about flying, flight training, and each flight lesson, the better you will do.

GLEIM'S FAA TEST PREP CD-ROM SOFTWARE

Gleim's **FAA Test Prep** (32-bit version) is the standard in FAA knowledge test preparation. Containing the Gleim study outlines and figures from our books, FAA Test Prep provides you with all the material you need to study for most of the FAA airman knowledge tests in one unique, easy-to-use program. Some of the features you will find with this popular study software are:

- A complete library of FAA charts and figures contained within the program, including on-screen drawing capabilities and a true course calculation feature
- The familiar Gleim outlines and questions contained in one convenient program
- Customizable test sessions that emulate the testing vendors (AvTest, CATS, LaserGrade)
- Improved performance analysis charts and graphs to track your study progress

GLEIM'S FAA AUDIO REVIEW

Gleim is pleased to offer **FAA Audio Review** for the private pilot -- airplane and the instrument rating -- airplane FAA knowledge tests in two formats. Choose between audiocassettes or compact discs. Make the most of your day and prepare for your FAA exam while driving, exercising, mowing your lawn, etc.

FAA Audio Review presents a series of 12 audio lectures covering all the information you need to know to pass the private pilot and instrument rating FAA knowledge tests. We believe you can carefully listen to Gleim's **FAA Audio Review** and then confidently and correctly answer the FAA questions found in the corresponding **FAA Written Exam** book or **FAA Test Prep** software.

FAA AIRMAN KNOWLEDGE TESTS

The computer-based FAA knowledge test can be taken at over 900 locations throughout the U.S. The FAA has contracted with private computer testing services to administer the tests. These companies charge a fee for each test you take. Your test is graded immediately at its conclusion and you will receive your Airman Computer Test Report (which you must take to your FAA practical test).

Currently the FAA has approved the following test vendors. Call for more information:

CATS (800) 947-4228 LaserGrade (800) 211-2754

In addition, AvTEST is a computer test vendor used by a number of Part 141 schools.

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OTHER BOOKS AND ACCESSORIES

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